

Claims

1. Method of treatment by carboxylation, before shaping, of a metal surface chosen from amongst zinc, iron, aluminium, copper, lead, and alloys thereof as well as galvanised, aluminium-coated, copper-coated steels, in oxidising conditions in relation to the metal, by bringing the said metal surface into contact with an organic or hydro-organic aqueous bath comprising at least one organic acid in free form or in the form of salt, characterised in that:
 - the said organic acid is a saturated or unsaturated aliphatic monocarboxylic or dicarboxylic acid,
 - the said organic acid is in solution and/or in emulsion in the bath at a concentration greater than 0.1 mole/litre,
 - the pH of the bath is acidic.
2. Method as claimed in Claim 1 in which the said organic acid is chosen from amongst the saturated monocarboxylic acids having from 5 to 16 carbon atoms.
3. Method as claimed in Claim 1 in which the said organic acid is chosen from amongst the unsaturated monocarboxylic acids having from 10 to 18 carbon atoms.
4. Method as claimed in Claim 1 in which the said organic acid is chosen from amongst the saturated dicarboxylic acids having from 4 to 12 carbon atoms.
5. Method as claimed in Claim 2 in which the said organic acid is chosen from amongst hexanoic acid, heptanoic acid, octanoic acid, nonanoic acid and decanoic acid.
6. Method as claimed in Claim 3 in which the said unsaturated monocarboxylic organic acid is undecenoic acid, oleic acid or linoleic acid.
7. Method as claimed in Claim 4 in which the said saturated dicarboxylic organic acid is sebacic acid or azelaic acid.

8. Method as claimed in Claim 5, characterised in that the said organic acid is heptanoic acid.
9. Method as claimed in Claim 8, characterised in that the bath comprises, in addition to heptanoic acid, decanoic acid or undecenoic acid.
10. Method as claimed in any one of Claims 1 to 9, characterised in that the organic or hydro-organic aqueous bath comprises a co-solvent chosen from amongst ethanol, n-propanol, dimethylsulphoxide, N-methyl-2-pyrrolidone, 4-hydroxy-4-methyl-2-pentanone or diacetone alcohol.
11. Method as claimed in Claim 10, characterised in that the co-solvent is diacetone alcohol.
12. Method as claimed in any one of Claims 1 to 11, characterised in that the said bath further comprises multivalent cations in the +3 oxidation state, chosen from amongst the rare earth metals at a concentration greater than or equal to 1.10^{-3} mole/litre, the pH of the bath being higher than 4.
13. Method as claimed in Claim 12, characterised in that the said multivalent cation is gadolinium.
14. Method as claimed in any one of Claims 1 to 13, characterised in that the said oxidising conditions are obtained by addition to the bath of a chemical agent adapted to the metal to be treated.
15. Method as claimed in any one of Claims 1 to 13, characterised in that the said oxidising conditions are obtained by causing an electric current to circulate between the said surface previously immersed in the bath and at least one backing electrode which has been likewise immersed.

16. Method as claimed in any one of Claims 1 to 15, characterised in that the concentration of organic acids in the bath, the conditions of use of the said bath and the oxidising conditions in relation to the metal to be treated are adapted to obtain on the metal surface a carboxylation coating with a weight per unit area of between 1 and 6 g/m².

17. Method as claimed in any one of Claims 1 to 16, characterised in that at the end of the treatment of the said surface a post-treatment is carried out with the aid of a bath containing multivalent cations in the +3 oxidation state, chosen from amongst the rare earth metals at a concentration greater than or equal to 1.10^{-3} mole/litre.

18. Use of the method as claimed in any one of Claims 1 to 17 for the temporary protection of the said metal surface against corrosion.

19. Method of producing a shaped metal sheet having a metal surface chosen from amongst zinc, iron, aluminium, copper, lead, and alloys thereof as well as galvanised, aluminium-coated, copper-coated steels, in which a carboxylation treatment of the said metal sheet is carried out in accordance with any one of Claims 1 to 17, the said treated metal sheet is oiled and it is shaped.

20. Method as claimed in Claim 19, characterised in that the said metal sheet is made from steel coated with zinc or with a zinc alloy and that it is shaped by stamping.